FINDING OF NO SIGNIFICANT IMPACT

DOE FUNDING OF THE CONSTRUCTION AND OPERATION
OF THE FACILITY FOR RARE ISOTOPE BEAMS
MICHIGAN STATE UNIVERSITY, EAST LANSING, MICHIGAN

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact (FONSI)

SUMMARY: The U.S. Department of Energy (DOE) prepared the *Environmental Assessment for DOE Funding of the Construction and Operation of the Facility for Rare Isotope Beams, Michigan State University, East Lansing, Michigan*, DOE/EA-1684 (*FRIB EA*). Based on the analyses of environmental impacts in the Environmental Assessment (EA) and in consideration of the public comments received on the draft EA, DOE has determined that the Proposed Action is not a major Federal action significantly affecting the quality of the human environment within the definition of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321, et seq.), the Council on Environmental Quality regulations (40 CFR 1500–1508), and DOE's NEPA implementing regulations (10 CFR 1021). Therefore, the preparation of an Environmental Impact Statement is not required.

DESCRIPTION OF THE PROPOSED ACTION: DOE published a "funding opportunity announcement" (FOA) on May 20, 2008, seeking applications for the conceptual design and establishment of a particle acceleration facility—the FRIB—that met the criteria described in the FOA for less than or equal to $550 million over the next decade. Subsequent to construction, funding for operations would be allocated annually based on Congressional appropriations. In its review of the applications, DOE considered the results of an independent merit review process, as well as an environmental critique. On December 11, 2008, Michigan State University (MSU) was selected to design and establish the FRIB. Under the Proposed Action, MSU would design, construct, operate, and ultimately decommission the FRIB. DOE would maintain substantial involvement throughout the process

DOE and MSU propose to construct and operate the FRIB on approximately 15 acres (6.07 hectares) on MSU's East Lansing, Michigan, campus. Its design is composed of buildings and/or building additions for a heavy ion/proton accelerator and ancillary laboratories, support facilities such as a larger liquid helium production building, and offices. Construction and operations would occur on campus, adjacent to the existing National Superconducting Cyclotron Laboratory (NSCL), which would ultimately be subsumed into the FRIB. The function and scope of operations of the FRIB would be similar to those of the NSCL, but the FRIB would have substantially more power. The existing NSCL research program relies on a coupled cyclotron driver accelerator with an energy level of 200 megaelectron volt per atomic mass unit (MeV/u) and 1 to 2 kilowatts of beam power. The FRIB would be capable of a minimum energy of 200 MeV/u for all ions and up to 400 kilowatts of beam power. A reaccelerator, with energy up to 12 MeV/u for uranium and 20 MeV/u for lighter ions, is also proposed for the facility. The

linear accelerator tunnel would be situated in an excavation up to 75 feet below grade. The ground where the FRIB would be located has been previously disturbed. The U.S. Nuclear Regulatory Commission (NRC) and the State of Michigan would both have regulatory jurisdiction over nuclear activities at the FRIB, and the State of Michigan would regulate other aspects of construction and operation. MSU's broad-scope NRC license would be modified to cover oversight of all accelerator-related activities.

The FRIB would provide research opportunities for an international community of approximately 1,000 university and laboratory scientists, postdoctoral associates, and graduate students. The research conducted at the FRIB would involve experimentation with intense beams of rare isotopes—short-lived nuclei not normally found on Earth—that would enable researchers to address forefront scientific questions in nuclear structure and nuclear astrophysics. Operation would result in low levels of activation of air and groundwater, which MSU intends to manage according to NRC license requirements. Doses to workers and members of the public are anticipated to be less than one-tenth of the NRC radiation protection standards.

ALTERNATIVES: As required by Council on Environmental Quality regulations, the *FRIB EA* evaluates a No Action Alternative to serve as a basis for comparison with the action alternatives. Under the No Action Alternative, the FRIB would not be constructed and operated at MSU and the enhanced opportunities for scientific research would not be pursued. Other alternatives, including construction of the FRIB at another site, were considered and eliminated.

PURPOSE AND NEED: The purpose of the Proposed Action—the design, construction, and operation of the FRIB—is to support DOE's mission to advance our basic understanding of science. The purpose of the Proposed Action is consistent with the outcome of DOE's procurement process for the design, construction, and operation of an accelerator that produces rare isotope beams. DOE determined that the establishment of the FRIB is a high priority for the future of U.S. nuclear science research. The FRIB would establish a highly sophisticated research laboratory that would produce intense beams of rare isotopes. These beams enable scientists to study the nuclear reactions that power stars and generate the elements found on Earth; explore the structure of atomic nuclei, which form the core of all matter, and the forces that bind them together; test current theories about the fundamental nature of matter; and play a role in developing new nuclear medicines and other societal applications of rare isotopes.

AFFECTED ENVIRONMENT: The proposed FRIB would be constructed and operated adjacent to, and would eventually incorporate, the existing NSCL, which is located in the northeastern section of the MSU campus. The areas that would be utilized during construction are previously disturbed areas currently used for parking lots and support areas around the NSCL. During construction, an existing soil disposal area located south of the railroad tracks, east of Farm Lane, and north of East Mount Hope Road would be used for construction staging and soil disposal. This area is an open field within an area of undeveloped fields and has historically been used for these purposes. Both the FRIB construction site and the soil disposal site are

highly disturbed and contain no water bodies or streams, historic resources, wetlands, floodplains, and no threatened or endangered species.

ENVIRONMENTAL IMPACTS: The *FRIB EA* evaluates the potential environmental effects that could result from implementing the Proposed Action or the No Action Alternative. As it is still early in the design phase of the FRIB, the *FRIB EA* considers a range of potential designs or configuration options for the FRIB that would provide a reasonable "bound" of the environmental impacts of construction, operation, and decommissioning of the FRIB. The configuration options under consideration by the conceptual and preliminary design teams would not be expected to substantially change the projected environmental impacts of construction, operation, or decommissioning of the FRIB. Therefore, the options discussed in more detail in the *FRIB EA* are those that might have somewhat different, but still small, environmental impacts. These options may not precisely reflect the final design, but impacts of the final design would be bounded by the configurations considered in the *FRIB EA*.

Potential impacts identified for the resources evaluated in the *FRIB EA* include the following:

- Land Use and Visual Resources – MSU would construct the proposed project on a previously disturbed site directly adjacent to the existing NSCL and use an existing nearby soil disposal area for storage and disposal of soils. Both activities are consistent with current MSU planning. During construction, use of Bogue Street, Wilson Road, and Shaw Lane would be disrupted. In addition, the Wharton Center surface parking area would be closed and demolished and used as a laydown area during the construction period. Shaw Lane between Bogue Street and Hagadorn Road would be closed to through-traffic for approximately 2 months if the linear option is selected. Traffic would be rerouted to accommodate the road closures.

  No land use impacts from the operation of the FRIB are anticipated. No adverse visual impacts were identified. During decommissioning, underground structures would be decontaminated and buried in place or otherwise managed per NRC requirements and any aboveground structures would be removed or redeployed.

  With the No Action Alternative, these impacts would not occur.

- Geology and Soils – The FRIB would be constructed using cut-and-fill construction techniques. Approximately 325,000 cubic yards (248,000 cubic meters) of soil would be excavated during the construction of the tunnel associated with the FRIB. Construction is not expected to otherwise adversely impact the geology or soils of the area. Affected soils are stable and acceptable for standard construction requirements. Erosion prevention and sedimentation control measures would minimize the potential for adverse impacts. No impacts on geology and soils from the operation of the FRIB are anticipated. With decommissioning, underground structures would be buried in place or otherwise managed per NRC requirements that would be established at that time. Fill material would be required to bury underground structures. The source and quantity of fill material would be determined at the time of demolition.

With the No Action Alternative, these impacts would not occur.

- Water Resources – Erosion and sedimentation controls during construction would limit potential impacts on surface water. During construction, moderate to heavy volumes of groundwater would likely be encountered where excavations extend below the water table. A dewatering system could be used during construction to temporarily lower the water table below the level of the tunnels. The resulting groundwater would be filtered and discharged into the existing stormwater drainage system. After construction, the groundwater levels would be expected to return to normal with no long-term impacts or changes in groundwater flow or levels.

  No impacts on wetlands or floodplains would occur from construction, operation, or decommissioning because none exist at the project site or soil disposal area.

  Normal facility operations would not have adverse impacts on any surface water. During FRIB operation, neutrons produced from scattered beam particles that penetrate the thick concrete walls of the linear accelerator (linac) tunnels and that could activate groundwater would result in low levels of activation of any soil and groundwater adjacent to the FRIB tunnels, which MSU would manage according to NRC license requirements. These NRC license requirements require that the concentrations of radionuclides in the groundwater be below NRC water effluent limits. Consistent with the MSU as low as reasonably achievable (ALARA) program, the FRIB project design team has established a design and operations goal, which is more than a factor of 10 times better than the NRC requirements. Moreover, the FRIB project design goal is to keep the average groundwater radionuclide concentrations in the region around the linac tunnel walls below drinking water limits established by the U.S. Environmental Protection Agency (EPA). Ensuring that the water adjacent to the FRIB tunnels would meet drinking water standards, which would normally be applied to water provided by a drinking water supplier after pumping and filtering, would provide a very high degree of protection for both the environment and the public.

  With the No Action Alternative, these impacts of construction would not occur.

- Air Quality – Construction emissions would be short-term, sporadic, and localized. Fugitive dust would be controlled to minimize emissions. No adverse impacts would occur from construction emissions. No continuous emissions of criteria air pollutants are expected to result from the Proposed Action during operations.
  With the No Action Alternative, the construction impacts would not occur.

- Biological Resources – As the project site has been previously disturbed and has a high degree of development, impacts on protected flora and fauna are not expected. The existing soil disposal site has also been previously disturbed by soil disposal activities similar to those that would be required for the Proposed Action, so impacts on protected flora and fauna are not expected. No threatened or endangered species or critical habitats exist at the project site or soil disposal area.

With the No Action Alternative, there would be no impacts on biological resources.

- Noise Impacts – Temporary and short-term noise would be generated during construction and would have the potential, without mitigation, to adversely affect any sensitive nearby receptors. The nearest noise-sensitive receptors include dormitories to the north of Shaw Lane that are within about 140 feet (43 meters) of the proposed tunnel excavation location and within 50 feet (15 meters) of the proposed front-end building location. Other noise-sensitive facilities within 150 feet (46 meters) of the excavation include the Wharton Center for Performing Arts, the plant biology laboratories, and the Biochemistry Building. The Biochemistry Building, which includes laboratories that contain vibration-sensitive experiments, is within about 50 feet (15 meters) of the tunnel excavation and the connector high bay and south high bay extensions. Pedestrians in the area near the construction site would be impacted by construction noise. Construction noise could be mitigated by employing standard construction noise mitigation, including use of quieted equipment, shielding of noisy equipment and activities, careful location of noisy equipment, proper maintenance of equipment, and administrative controls such as scheduling to avoid interfering with noise-sensitive activities. MSU would control the impact of construction activity on normal operation of the campus, especially on noise- and vibration-sensitive activities.

  Workers would be expected to wear appropriate hearing protection during construction.

  During operations, noise sources would be relatively minor and similar to ongoing NSCL activities.

  During decommissioning, noise sources would be similar to those during construction, although the amount of earthmoving activity would be much less. Therefore, noise impacts from decommissioning are expected to be less.

  With the No Action Alternative, operational noise impacts of the NSCL would remain and would be minor.

- Utilities – Existing nonpower utilities supporting the NSCL have adequate capacity to support construction and operation of the FRIB. Estimated power requirements for FRIB operations are about 18 megawatts, which would be supplied by offsite commercial power. The FRIB would use the existing 21-megawatt substation at the MSU Power Plant and require a new duct bank to deliver power to the FRIB.

  With the No Action Alternative, these impacts would not occur.

- Cultural and Historical Resources – No intact cultural or historical resources are known to exist in potentially affected areas. All surface areas of the project site have been previously disturbed. Based on archaeological and architectural surveys previously conducted on the MSU campus in the vicinity of the NSCL, no impacts are expected on

cultural or historical resources during FRIB construction, operations, or decommissioning, including excavation or equipment storage and rock/soils stockpiling in the proposed construction staging area.

With the No Action Alternative, no impacts would be expected.

- Health and Safety – Construction workers would be subject to typical hazards and occupational exposures faced at other industrial construction sites. Contractors would be expected to comply with existing health and safety requirements. MSU would apply its existing occupational health and safety program to the new operations, and impacts on workers or the public would be low.

  The FRIB would be designed and operated to ensure that no adverse impacts on the public would occur during operations from exposure to direct radiation in the vicinity of the FRIB tunnels, controlled airborne radiological releases from the FRIB stacks, ingestion of contaminated groundwater, or accidents. Existing radiation safety practices and experience at the NSCL and other particle accelerators are adequate to ensure that the radiological impacts of operation of the accelerator, including potential accidents, would be kept small and well within applicable NRC and EPA standards. MSU has committed to ensuring that the FRIB would be designed, constructed, and operated in a manner that maintains the NSCL's excellent environmental and safety record by continuing the MSU ALARA program. The FRIB would be designed and operated following the same strategy of radiation safety management that has been successfully used at the NSCL. That strategy is to: 1) abide by all limits and license commitments, 2) maintain, as a goal, individual and collective doses at or below as low as is reasonably achievable, and 3) manage the facility consistent with MSU and FRIB safety management practices (currently certified International Organization for Standardization [ISO] and Occupational Health and Safety Assessment Series [OHSAS] programs). The strategy has been effective for the NSCL and would also be effective for the FRIB. For the NSCL, incidents and near-misses since the institution of the current NSCL certified ISO 9001 (Quality Management Systems), ISO 14001 (Environmental Management Systems), and OHSAS 18001 (Occupational Health and Safety Management Systems) programs have been localized and were not considered to pose significant hazards to personnel, the public, or the environment.

  As part of the design process, a range of potential accident scenarios is being considered to ensure that the FRIB would have adequate protections to minimize potential impacts. Accident conditions (including radiological conditions) are being analyzed as part of the development of a conceptual design, which is ongoing for the FRIB. These analyses continually evolve as the design effort progresses to ensure all credible hazards are evaluated and appropriate controls are included in the design to safeguard the public, FRIB personnel, environment, and the FRIB mission. For the FRIB, hazards that have been identified include electrical and chemical, non-ionizing radiation (lasers), and waste handling, as well as ionizing radiation, oxygen-deficient atmosphere, and cryogenic hazards for the accelerator, target building, and support systems. The design

and operational controls included in the FRIB design are intended to provide a robust level of protection against these postulated events and provide protection for the public, FRIB workers, and the environment. Based on the experience of other accelerator facilities, the evaluations conducted and MSU's commitment to certain design features and safety controls for the FRIB, it is expected that the health and safety impacts (risk) of foreseeable accidents can be managed at acceptably low levels through the facility design process and control of operations.

With the No Action Alternative, the health and safety impacts of NSCL operations would continue to be managed and would be low.

- Waste Management – Construction activities and operation of the FRIB would generate waste, possibly including hazardous waste. Waste would be characterized, stored, and disposed of in accordance with applicable regulations. Disposal would occur in existing facilities.

  During operations, hazardous and radioactive waste streams would be similar to existing NSCL wastes and would be handled and disposed of using the existing MSU waste management program; no adverse impacts would occur. With the increased size and scope of operations, waste generation would increase but would be well within the existing capability and capacity of the MSU waste system.

  With the No Action Alternative, the incremental waste generation associated with FRIB operation would not occur, and waste levels associated with the NSCL would remain the same.

- Transportation – No adverse impacts associated with the transport of construction materials are expected. Construction activities would cause an increase of approximately 400 vehicles per day due to the shipment of construction materials and wastes and the commuting of construction workers. The construction traffic would cause an increase of less than 4 percent in total traffic on the surrounding roads. Based on the estimated traffic volumes during construction, it is estimated that there would be fewer than 2 construction-related accidents involving a motor vehicle, with no fatalities or injuries. Construction workers commuting to the site would experience approximately 17 accidents, no fatalities, and 4 injuries over the duration of the construction period.

  Road closures during FRIB construction would disrupt and divert traffic for periods of up to 2 years. Temporary closures of Bogue Street, Shaw Lane, and Wilson Road would also impact pedestrian and bicycle traffic. Temporary walkways would be established with sufficient safety features such as fencing to direct pedestrian and bicycle traffic around the construction site.

  With the No Action Alternative, the traffic disruptions associated with FRIB construction and incremental impacts associated with FRIB operation would not occur.

- Socioeconomics and Environmental Justice – Construction of the FRIB is expected to last from 2012 through 2016 and annual construction employment is expected to peak at 175 employees. Total peak year earnings from both direct and indirect employment are estimated to be $20.2 million. Total spending to build the facility is estimated to be approximately $550 million, of which $348 million is assumed to be spent locally. Indirect economic output generated by that spending is estimated to be $279 million, for a total economic impact of $627 million during the construction phase. When the FRIB is fully operational MSU estimates that it could require up to approximately 500 operations and support staff. When compared to employment at the existing NSCL, MSU estimates the FRIB could add up to approximately 160 new professional and technical service jobs. No high adverse human health or environmental impacts are anticipated as a result of the construction or operation of the FRIB; consequently, there would be no disproportionately high adverse effects on minority or low-income populations.

  With the No Action Alternative, these impacts would not occur.

- Cumulative Impacts of the Proposed Action – No substantial cumulative impacts on the environment would be anticipated from implementing the Proposed Action. The cumulative impacts of construction of the FRIB and other construction projects at MSU during the FRIB construction timeframe would still be small. Operational impacts of the FRIB would be small and those impacts, collectively with other MSU operational impacts, are also expected to be small.

PROPOSED FONSI: On May 26, 2010, per 10 CFR § 1021.322 (d), DOE made a draft of this FONSI available for public comment. Three comment documents were received. One commenter encouraged DOE to proceed to a final FONSI. Another posed questions about the project largely addressed in the EA itself. The last commenter reminded DOE of the importance of minimizing generation of greenhouse gases. MSU is a member of the Chicago Climate Exchange and has pledged to reduce or offset six percent of its greenhouse gas emissions and is committed to looking for additional opportunities to limit its carbon foot print.

PUBLIC AVAILABILITY: Copies of the *FRIB EA* and FONSI may be viewed at the following locations:

Michigan State University
Main Library
100 Library
East Lansing, Michigan 48824

Chicago Office, Public Reading Room
University of Illinois at Chicago
University Library, Document Department
801 South Morgan Street, 3rd Floor Center

Chicago, IL 60607

U.S. Department of Energy
FOI Reading Room
Room 1E-190, Forrestal Building
1000 Independence Avenue, Southwest
Washington, D.C. 20585

The FRIB EA may also be viewed on-line at: http://www.frib.msu.edu/NEPA

Further information regarding the FRIB EA and the NEPA process is available from:

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DETERMINATION: Based on the analyses in the *FRIB EA*, and after careful consideration of all public and agency comments, DOE has determined that DOE funding of the construction and operation of the FRIB at MSU in East Lansing, Michigan (including any of the the configuration options analyzed, hybrids thereof, or similar options which have impacts that are bounded by those of the options analyzed), does not constitute a major Federal action that would significantly affect the quality of the human environment within the context of NEPA. Therefore, the preparation of an environmental impact statement is not required.

Issued in Washington, D.C., this 14 day of Sept, 2010.

W. F. Brinkman, Director
Office of Science